3.3.2. Static Position Accuracy

3.3.2.1. Purpose

The purpose of this test is to measure the static (ground) position accuracy of the INS over a mission relatable period to isolate INS errors that are not caused by the dynamic (flight) environment. The static accuracy becomes a baseline for measuring the effects caused by the dynamic environment.

3.3.2.2. General

In static testing, the INS is evaluated while the aircraft remains on the ground. Dynamic testing is performed while airborne. Static testing allows the errors caused by the INS itself, whether cyclic, linear, exponential, etc. to be isolated from errors induced by maneuvering effects. The static accuracy becomes the baseline from which to gauge the effects of the dynamics of flight. One mission relation for static accuracy is to relate the requirement to perform quick reaction alerts with the INS navigating statically on the ground until launch time.

3.3.2.3. Instrumentation

A stop watch and data cards are required for this test, a voice recorder is optional.

3.3.2.4. Data Required

Record the actual surveyed alignment location latitude and longitude. At five minute intervals, starting at time zero, record the elapsed time and the displayed latitude and longitude. Completely describe any aircraft motion, including the time that it occurs and note any INS fault indications.

3.3.2.5. Procedure

Complete an alignment as outlined in the previous test technique, Initialization and Alignment. As the INS is placed in a navigation mode, start the stop watch and record the displayed latitude and longitude. Record the displayed latitude and longitude each five minutes. Completely describe any aircraft motion, along with the time of the occurrence. Record any INS fault indications. As a minimum, record data for the length of the maximum mission duration of the aircraft or two Schuler cycles, whichever is shorter.

3.3.2.6. Data Analysis and Presentation

Subtract the displayed latitude and longitude from the surveyed latitude and longitude. Convert the latitude and longitude difference into nm using equation (21). Plot the data as north-south and east-west error versus time. Annotate the plots with any significant events noted during the test, such as movement of the aircraft or system alerts. Analyze the trend of the plots for possible causes of the errors as outlined in the theory section. Relate the static accuracy to the requirement to remain on the ground, while the INS navigates statically, for long periods of time before a quick response alert launch. Check to see if a significant change in the error plot occurs at the time of aircraft motion or when system alerts occur. Relate the effects of aircraft motion to the requirement to perform maintenance on the aircraft after an alignment. Relate the static accuracy of the INS to the system alerts. Repeated alerts that imply degraded accuracy should be accompanied by that degradation or they are false alarms. Completely investigate any INS alerts following the test. Relate the occurrence of confirmed false alarms to the possibility of unnecessarily aborted sorties.

3.3.2.7. Data Cards

A sample data card is provided as card 39.

CARD NUMBER ___

STATIC POSITION ACCURACY

[AFTER PERFORMING THE INITIALIZATION AND ALIGNMENT TEST, SELECT A NAVIGATION MODE, START THE CLOCK AND RECORD DATA AT TIME 0 AND EACH 5 MINUTES AFTER. DESCRIBE ANY SIGNIFICANT MOVEMENT OR SYSTEM ALERTS AS NOTES AT THE APPROPRIATE TIME. CONTINUE THE TEST FOR _____ MINUTES.]

SURVEYED POSITION _____ _____

POINT NUMBER	ELAPSED TIME	DISPLAYED LATITUDE	DISPLAYED LONGITUDE	NOTES:

Card 39: Static Position Accuracy Data Card